LIBRARIANS AND THE NATURE OF EXPERTISE

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INTRODUCTION

There is a large body of research which has examined the differences between novices and experts. A review of this research indicates that there are certain characteristics of expert performance that are generalizable across many different domains. It is reasonable to assume that such characteristics will also apply to expert performance in the area of librarianship. As libraries and their users will benefit from more expert librarians, an understanding of expertise and how it develops can be used by Library managers and professional librarians who seek to improve performance.

It is perhaps easiest to start with an understanding of what 'expert' means in everyday usage. Generally, an expert is seen as someone who has specialist knowledge or a high level of ability in a particular skill. Thus expertise is about possessing knowledge or skill (or both). Along with this, there is a sense that it is not enough to know things; experts also use their knowledge, putting it into practice or performing in some way. However, not everyone working in a specific domain is an expert as some people know more and perform better than some of their colleagues, which implies that expertise might be somewhat relative.

DREYFUS MODEL OF SKILL ACQUISITION

Before examining the nature of expertise, it is useful to consider it in the context of beginner to expert skill development. One of the best known models is that of Hubert and Stuart Dreyfus, two brothers who proposed a five-stage model of adult skill acquisition (originally described in their 1988 book *Mind Over Machine* and summarized in Dreyfus, 2004):

1. *Novice*: Uses established objective facts to function. Rules are non-situational or context-free. Decisions are analytical and learner is emotionally detached.

2. *Advanced Beginner:* Begins to adapt learned rules to a context and therefore uses a mix of situational features and non-situational rules. Decisions are analytical and learner is emotionally detached.

3. *Competence: U*ses rules and context to formulate goals and plans. Rules begin to be replaced by reasoning. Choice of action becomes easier, but the learner feels responsible for choice and frequently vacillates between competing viewpoints. Can feel exhausted, overwhelmed. Decisions are analytical and learner is detached in understanding and

decision-making, but involved in the outcome of the situation.

4. *Proficiency:* Enough experience has been accumulated so that there is less need of planning and problem solving – increasing situational discrimination, rather than dependence on rules and principles. Decisions are made rapidly without vacillating among options. Involved understanding, but detached decision-making

5. *Expert:* Uses practical wisdom in conjunction with intuition that is taken to a higher level. Has vast experience and the ability to create patterns from that experience. Ability to make more subtle and refined discriminations. Intuitive and involved decision-making and understanding.

Novices will do every step and follow every rule, whereas experts learn to set priorities because they know what to discard if they can't do everything. Experience teaches us which rules can be ignored or dropped to the 'do it if there is time' category. Those with the most experience work more effortlessly and intuitively. Novices have to work and think harder than experts, so we need to judge the performance of novices and experts differently. Novices are often known for their passion and energy so employers tend to feel they are getting good value from people at this level. Unfortunately, customers tend not to agree: They want to consult experts because novices might (and often do) get things wrong.

EXPERTISE RESEARCH

One of the best known studies in expertise was done in 1965 by Adrianus De Groot who compared chess players of varying levels of skill. It does not take long to master the rules of chess, but to become an expert takes years. De Groot found that chess experts did not think further ahead than lesser players nor did they consider more possibilities (in fact they tended to consider fewer moves, but they only considered good moves). What De Groot did find was that chess masters could more accurately remember board arrangements as long as those arrangements were meaningful. This suggested that expertise is not a simple case of superior memory, because experts were no better at remembering random arrangements.

Chase and Simon (1973) took this one step further by trying to identify the nature of the chess masters' memory for chess configurations. They found that experts memorized arrangements in chunks of about eight pieces that were related in a significant way. Any chessboard arrangement could then be remembered as a set of six or seven of these chunks. Chess masters have thousands of these chunks stored in their memories, constituting a huge specialized knowledge. While more recent studies have indicated that the superior performance by chess masters is more complex than these early studies suggested, what remains is the recognition that experts know an incredible amount and their knowledge is organised in meaningful ways.

These findings led to a wealth of similar studies comparing experts and novices in many areas, such as music (e.g. Sloboda, 1991), sports (e.g. Allard & Burnett, 1985), medicine (e.g. Ericsson & Lehman, 1996; Patel & Groen, 1991), nursing (e.g. Benner, 1984; King & Clark, 2002) and air traffic controllers (Niessen, Eyferth & Bierwagen, 1999), as psychologists sought to identify the characteristics of superior performance. (For a general review of the research in this area see Ericsson & Smith, 1991 and Bereiter and Scardamalia, 1993.)

Such studies confirmed that experts have a vast amount of knowledge "…- knowledge not of any very exalted kind, just the kind of knowledge that you would expect to result from increasing familiarity with the objects of one's trade, but in far greater quantity than anyone had imagined." (Bereiter & Scardamalia, 1993 p.28). Furthermore, this knowledge is not retained as discrete units of memory, but rather is stored in meaningful chunks. The fact that these experts do not recall meaningless arrangements (e.g. bad electrical circuits, impossible game plays), tends to rule out memory as the differing factor (Bereiter & Scardamalia, 1993 p.28).

With this wealth of research has come an understanding that expertise (regardless of the specific domain) is an outcome of skill and knowledge acquired after years of training and practice. Hayes (1985) reviewed a large number of these studies and found that to get to expert status in a given area takes approximately 10,000 hours of practice or experience. Chi, Glaser and Farr (1988) note that experts excel primarily in a single domain. This is not surprising given that 10,000 hours equates to approximately five years of working a forty-hour week.

However, accumulating hours of experience is not enough. It appears that experts have a deeper whole-system understanding than do non-experts. Lesgold and Lajoie (1991) reported that some US Airforce technicians were much better than others at diagnosis. They found that the experts were not better at electronics, nor did they go about problem solving in a different way, but rather they had a far deeper understanding of the system than the non-experts.

So, not only is there a need for the case knowledge and episodic knowledge that comes from experience (Berliner, 1994a p.14), there is also a need for theoretical knowledge of how the case and episodic knowledge are linked, so that there is a deep understanding of how that knowledge fits together in complex arrangements and at very complex levels. Formal study can help to build understanding and system knowledge faster because a strong theoretical foundation should lead to a faster understanding of the system and how things connect. But without experience, the theory is not informed by the episodic and case knowledge gained through practice.

Berliner (1994b) provides a summary of the key characteristics of expertise arising from the body of research across many fields:

- Expertise is specific to a domain, developed over hundreds and thousands of hours, and it continues to develop and development is not linear.
- Expert knowledge is structured better for use in performances than is novice knowledge.
- Experts represent problems in qualitatively different ways than do novices. Their representations are deeper and richer and overall they are faster problem solvers.
- Experts recognize meaningful patterns faster than novices.
- Experts are more flexible, are more opportunistic planners, and can change representations faster when it is appropriate to do so. Novices are more rigid in their conceptions.
- Experts perform familiar tasks intuitively allowing conscious processing of ongoing information.
- Experts develop self-regulatory processes as they engage in their activities.

More recently researchers have found that the quality of time spent practising is as important as the quantity. In fact, deliberate practice is necessary as learners must strive to improve. It is important to note that performing is not enough, practice is needed. Performing is simply doing what you do over and over again, whereas practicing requires an intention to do better or do more. Performers, without conscious improvement, may be able to do the same skills in less time (i.e. become more efficient) but they do not become more skilled unless they engage in deliberate practice at an appropriate level of difficulty. This includes a willingness to do badly sometimes, in order to learn how to do better (Guest, Regehr and Tiberius, 2001).

However, research and observation suggest that most individuals do not engage in deliberate practice or explore new methods which may be unreliable (especially if that practice or exploration may result in failure). There is a tendency to favour entrenched activities rather than new ones (Ericsson 1996).

DIFFERENCES BETWEEN EXPERT AND PROFICIENT PRACTITIONERS

Until the late 1980s expertise research tended to focus on comparisons between experts and novices or beginners. Then Scardamalia and Bereiter in their studies of expertise in writing discovered that expert writers worked harder, did more planning, revision and problem-solving than non-experts (1991). They found that bad writers without consciously trying to improve, without practice, simply become more fluid bad writers, not better writers. Poorer writers minimized opportunity for growth, whereas better writers maximized the opportunity.

At first this suggested that expertise in writing was different from that of other areas since one of the characteristics of experts is that they appear to work effortlessly compared with novices. However, on further exploration Bereiter and Scardamalia determined that with writing "…the likely effects of elaborating constraints is to produce a more complex and novel task" (1991, p173). On further consideration, they realised this was not unique to writing, but was typical of people in any discipline who were working to achieve a superior result.

This finding led Bereiter and Scardamalia to explore the differences specifically between proficient and expert practitioners. They point out that there are obvious differences between novices and experts, but novices with practice and experience stop being novices, yet not everyone becomes an expert. Thus they wanted to know why some people remain merely competent while others go on to become recognised experts. Bereiter & Scardamalia suggest that some practitioners, once they have reached a proficient level, 'perform' to maintain skills rather than to 'surpass themselves'. They argue that non-expert experienced practitioners fit tasks to existing competence, but experts extend their competence to fit the requirements of the task (1993, 157).

Guest, Regehr and Tiberius ask why most practitioners are willing to accept a mediocre level of performance and avoid the deliberate practice necessary for improvement. They consider whether it may be laziness and/or lack of self-awareness. Learning is hard work; beginners have to think harder, so for some people, it may be easier to stay at a proficiency level rather than move on. Similarly, people often do not recognise their own deficiencies or do not realise what is necessary to improve. They may appear to be doing their best, but perhaps if they

knew how to do better, they would. However, they reject these explanations in favour of a third; that many people lack the conceptions of what it means to be a dynamic expert (2001, 79-80).

This gives rise to two contrasting theories of expertise. On one hand it is argued that expertise develops through experience: Because novices have little experience, each task they do increases their experience (episodic knowledge) and each time they perform a task, it is accomplished in less time. Each encounter takes less effort but also involves less learning. With enough experience, little effort is required as no new experiences are encountered. So the mark of expertise becomes the absence of learning. Critics of this model argue that while experience is necessary for expertise it is not in itself sufficient. Expertise is not a simple association with the amount of work performed; the individual's attitude to the work is also important. They argue that expertise develops as a result of progressive problem solving. Some experienced practitioners will seek out new experiences as soon as they master a task. They seek to constantly grow their knowledge and better understand their area. They seek opportunities to learn rather than just perform well repeatedly. Such practitioners are said to be working at the 'growing edge' of their knowledge; Bereiter & Scardamalia, (1993).

These two models can be used to describe two aspects of experienced professionals. The first model describes the experienced and proficient, but not expert, practitioner and the second identifies the experienced and expert practitioner. Experienced non-experts choose to approach their profession with the aim of working as efficiently as possible – i.e. minimizing effort and seemingly doing more (for example, the faster you can answer a reference question the more reference questions you can answer and thus you perceive yourself to be performing well).

Experienced experts, on the other hand, choose to address problems that fall at the upper limit of complexity that they can handle. They are always looking for new problems and challenges, seeking to broaden the scope of their expertise. This suggests that motivation and attitude are fundamental to the development of expertise.

Bereiter and Scardamalia view expertise is a process rather than a state – it is something people do, rather than what they have or know. Thus, expertise is not an end to be attained – but a way of going about everything we do. Experts focus on meta-learning (learning how to learn) rather than on mastering tasks.

IMPLICATIONS FOR LIBRARIANSHIP

The relative merits of the levels of qualifications and experience in determining the starting point of 'professional' librarianship are often debated, particularly in New Zealand where there are two major library qualifications (one undergraduate and one post-graduate). Recently this debate has become murkier as some claim that attitude is what really matters because you can do skills training on the job but you can't train for attitude. An understanding of the nature of expertise might shed some light on this debate.

The need for a formal qualification is one of the defining characteristics of a profession. Qualifications provide an indication that the holder has attained a certain level of knowledge

or skill. In a complex field like medicine, you cannot put people into an operating theatre to practice brain surgery on live patients while they are learning the theory - the risk is too great, hence the need for formal training is obvious.

While the risks of someone with little or no library knowledge practicing librarianship on live customers is likely to be less serious than in the medical profession, it is still not desirable. Most library services cannot be reduced to situations where decisions can be made using the hard and fast rules that novices and advanced beginners require. With a formal qualification, a new librarian will begin professional practice with at least some knowledge. Furthermore, the theory acquired through formal study should enable faster sense-making of the episodic knowledge they are accumulating as their experience increases, thus allowing them to move more rapidly to competence and proficiency levels.

Even if novices or beginners are trained on the job, it is going to be a long process since expertise theory suggests that it takes about 10,000 hours or five years to acquire enough knowledge and experience to become an expert librarian. Librarians who begin their 'practice' with a formal library qualification are part way towards their 10,000 hours when they start. The less knowledge a new librarian arrives with, the more educating and training the employing library will need to do.

Expertise research also suggests that the important factor is not whether a qualification is necessary or unnecessary, nor whether experience or attitude can substitute for a qualification, or vice versa. Rather, library employers should be aware of the importance of acquiring extensive knowledge and experience, and thus establish individual training and professional development programmes that build on existing knowledge and experience. Indeed the challenge for librarians and their managers lies in ensuring that all staff not only gain enough experience to accumulate knowledge but also have the opportunity to think about that experience and explore how it all fits together. Training and skill development is not enough, meta-learning and reflective practice must be encouraged and time allowed for it.

What then of attitude? Common sense alone tells us that an appropriate attitude is essential because all the knowledge and experience in the world is useless if a librarian is not willing to apply it. But it is also important that attitude is not confused with personality or temperament. Pleasantness and perkiness, for example, are not essential attributes of expertise. However, the willingness to explore, to challenge oneself, to make mistakes and learn from them, to go beyond efficiency and aim for maximum effectiveness are essential characteristics of librarians who want to become expert practitioners.

What then of our experienced professionals who may not be career experts? Is there a place for them in today's library? It is a challenging question and one for which the research suggests conflicting answers. Guest, Regehr and Tiberius (2001) appear to suggest that teaching practitioners about the effect and importance of meta-learning may overcome the lack of a conception of what it means to be an expert. However, Bereiter and Scardamalia believe that experts make a decision early on in their careers to take a progressive problem solving approach, which suggests that those who don't may not easily change their approach.

So the options are to encourage experienced practitioners to become experts by educating them about expertise and bringing about a change in attitude and motivation, or to accept that there is a need for both those who seek to work efficiently and those who seek to work more effectively. Will those librarians who need to work at the growing edge of their expertise cope with the inevitable routine tasks which can dominate any area of librarianship? How many experts do we need? Perhaps the challenge for library managers lies in balancing staffing so that there is a mix of those who seek efficiency and those who seek effectiveness.

A further implication of expertise theory for librarianship arises when we consider performance evaluation. There is a need to judge performance of experts and non-experts differently. As noted earlier, learning is hard work. If experts are always learning will they be perceived as beginners? Efficiency oriented people may appear to do less but may achieve more. Career experts need time to think, explore and make mistakes (on which they reflect and learn) but may appear to achieve less.

As education is usually related to acquiring knowledge and understanding concepts, and training is more often about acquiring skills, perhaps the answer lies in identifying when training and practice is appropriate and when it may be more effective to focus on education and learning. Either way, an understanding of expertise will help libraries to ensure that their staff (those just starting out and those with years of experience) have the knowledge and skills to cope with the ever changing demands of today's knowledge society.

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